PATENT SPECIFICATION

DRAWINGS ATTACHED

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COMPLETE SPECIFICATION

Improvements in or relating to Artery Clamps

I, MIHALY GERENDAS, a Hungarian citizen of 18, Ferenczi I. utca, Budapest V, Hungary, do hereby declare the invention, for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention is concerned with improvements in or relating to artery clamps.

By the term "artery clamp" as used herein is meant a device which is capable of closing an artery, and the term includes devices which are capable of closing veins.

In surgical practice the haemorrhage of minor arteries or veins has been arrested for centuries by gripping the bleeding artery or vein with a forceps (Kocher, Pean) and ligaturing the artery or vein with surgical silk or catgut, thereby closing the opening.

During surgical operations the ligaturing of arteries or veins takes considerable time and the ligaturing of deeply positioned arteries is rather difficult.

It is also possible to close arteries or veins with a metal device e.g. a silver clamp. This method is also fairly complicated and has the disadvantage that the metal which is used remains in the organism as a foreign body which generally has to be removed by a further operation.

An alternative technique is to use artery forceps during the operation, and the ligaturing of the arteries is left to the end of operation. In this case the artery forceps which spread fan-wise over the surgical field hinder the surgeon's work, and the ligaturing of the arteries or veins, following removal of the artery forceps is also time-consuming. In addition, it is sometimes impractical to leave the silk or catgut inside the patient since it frequently causes complications, such as the formation of an exudation and its ejection.

It has now been found that the disadvantages discussed above may be overcome by using an artery closing clamp made of protein material absorbable by the living tissues. The clamp may be quickly and safely fixed onto the artery or vein ends, may be left in the wound, and, after the union of the artery or vein walls and final closing, the clamp is absorbed by the body and disappears.

Accordingly, the invention provides an artery clamp for use in surgery on an organism produced from a protein base plastic material of human or animal origin and absorbable by the living tissues of the organism, the clamp preferably being provided with self-engaging locking means.

The locking means preferably includes an arrow-shaped locking member the head of which is deformable to enable it to be passed through a cooperating aperture in said clamp thereby to engage the locking means.

The clamp according to the invention may comprise two clamping members provided with two locking means spaced apart and two cooperating apertures, whereby said members can be locked together to clamp an artery introduced therebetween and disposed intermediate the two locking members.

Alternatively, the clamp may comprise a single member which is foldable to clamp an artery between spaced portions thereof, the locking means serving to lock the member in folded, i.e. closed, condition.

Three preferred embodiments of the invention are shown, for the purposes of illustration only, in the accompanying drawings, in which:—

Figure 1a is a perspective view of a clamp consisting of two cooperating members before closing onto an open artery or vein.

Figure 1b is a perspective view of the clamp shown in Figure 1a in the closed position on an artery or vein.

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Figure 2 is a perspective view of an open clamp consisting of two cooperating members.

Figure 3 is a perspective view of an open clamp consisting of one foldable member.

The clamp shown in Figure 1a consists of a male clamping member 1 and a cooperating female clamping member 2, said members being generally rectangular in shape. The member 1 is provided with locking means which comprises a deformable arrow-shaped locking member 3 the elastic edges 4 of which fix the clamp in position.

The member 2 is provided with two apertures 6 which cooperate with the locking members 3 of the member 1. The end of the vein or artery 5 to be clamped is passed between member 1 and member 2. In use, the end of the artery or vein 5 is placed between the member 1 and member 2 and the clamp is closed by passing the locking members 3 through the apertures 6, as shown in figure 1b, to engage the locking means, the clamp being retained in closed position by the elastic edges 4 of an arrowhead.

The clamp shown in Figure 2 consists of a female clamping member 7 which is provided with two apertures and a cooperating male clamping member 8 of generally square cross-section. The member 8 is provided with deformable arrow-shaped locking means 9 adapted to engage with the apertures of the member 7.

In use, the vein or artery to be clamped (not shown) is placed between the member 7 and member 8 and the clamp closed by passing the locking means 9 through the apertures of the member 7.

The clamp shown in Figure 3 consists of a single foldable member 10 generally rectangular in shape, which is provided, at one end, with deformable arrow-shaped locking means 11 and at the other end with an aperture 12, the locking means 11 and aperture 12 being adapted to engage and to retain the member 10 in folded condition, the member 10 partially enclosing a space 13. In use, the vein or artery to be clamped is placed in the space 13 and the clamp closed by threading the locking means 11 through the aperture 12, thereby to retain the member 10 in folded condition.

The artery clamps according to the invention may advantageously be produced from one or more proteins of human or animal origin produced by moulding under pressure a mixture of one or more powdered proteins of human or animal origin and a minor proportion of a plasticizer for said protein. It has been found that fibrin is particularly suitable, as clamps produced from fibrin are absorbed in a relatively short time (7—14 days) which is sufficient for the ends of the vein or artery to grow together.

The clamps according to the invention may be placed in position, for example, by inserting the clamp into the jaws of an artery clamping device, allowing the vein or artery to be clamped and closing the artery clamp. The clamping device may then be removed, the vein or artery being closed by the clamp.

It has been observed that an adequate closing thrombus sets in in the vein or artery within 3—4 hours, organic regeneration begins, and the ends grow together within 24—48 hours. The absorption of the clamp will take about 7—14 days, which is adequate for the purpose.

For the better understanding of the invention, the following Examples are given by way of illustration only:—

EXAMPLE 1

1 g Ethylene glycol is added to 2.5 g fibrin powder and the mixture is pressed in a pre-heated mould of a fly-press to a plate of 1 mm thickness.

Male clamping members, which are small rods 8×1×1 mm are formed in pressure dies from the plate, 4 mm long arrow shaped locking means are affixed at the ends of the rods, the arrows pointing in the same direction as one another.

Also by using a pressure die, 10×3×1 mm female clamping members are prepared which are provided with 2×1 mm holes. The position and spacing of the holes in the female member permit the locking means of the male member to engage with the holes, as shown in Figure 2 of the accompanying drawings. The vein end to be closed is inserted between the base plate and the closing member.

EXAMPLE 2

Plates 18×3×1 mm are pressed from the fibrin sheet produced as described in Example 1. One end of the plate is provided with an arrow shaped locking member and a hole is made at the other end, as shown in Figure 3 of the accompanying drawings. The plate is folded over around the vein end, and the locking member passed through the hole in the plate to close the clamp around the vein.

WHAT I CLAIM IS:—

1. An artery clamp, for use in surgery on an organism, produced from a protein base plastic material of human or animal origin and absorbable by the living tissues of the organism.

2. A clamp as claimed in claim 1 in which said clamp is provided with self-engaging locking means.

3. A clamp as claimed in claim 2 in which said locking means includes an arrow-shaped locking member, the head of which is deformable to enable it to be passed through

a cooperating aperture in said clamp thereby to engage the locking means.

4. A clamp as claimed in claim 2 or 3 comprising two clamping members provided with two said locking means spaced apart and two cooperating apertures whereby said members can be locked together to clamp an artery introduced therebetween and disposed intermediate the two locking means.

5. A clamp as claimed in claim 2 or 3 comprising a single member foldable to clamp an artery between spaced portions thereof.

6. A clamp as claimed in any of the preceding claims in which the protein base plastic material is derived from powdered protein mixed with a minor proportion of a plasticizer for said protein and moulded under pressure.

7. A clamp as claimed in any of the preceding claims in which the protein base material is fibrin.

8. A clamp as claimed in claim 1 substantially as herein described with reference to either of the Examples.

9. An artery clamp substantially as described with reference to Figs. 1a and 1b of the accompanying drawings.

10. An artery clamp substantially as described with reference to Fig. 3 of the accompanying drawings.

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972731 COMPLETE SPECIFICATION

1 SHEET *This drawing is a reproduction of the Original on a reduced scale*

absorbable in body (protein)

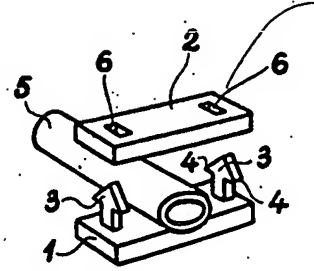

Fig. 1a

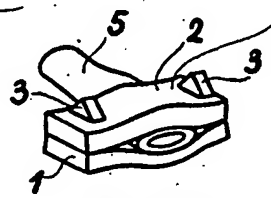

Fig. 1b

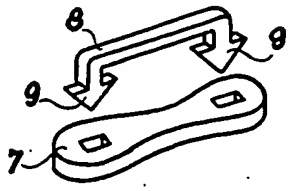

Fig. 2

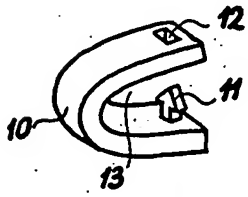

Fig. 3

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